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(71) Applicant *(for all designated States except US)*: CAMS S.R.L. [IT/IT]; Via Cameri, 61, I-28043 Bellinzago Novarese (IT).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)* : MINOLI, Franco [IT/IT]; Via Ina Case, 9, I-28047 Oleggio (IT).

(74) Agent: DI GIOVANNI, Italo; Ufficio Brevetti Dott. Ing. Digiovanni Schmiedt, Via Aldrovandi, 5, I-20129 Milano (IT).

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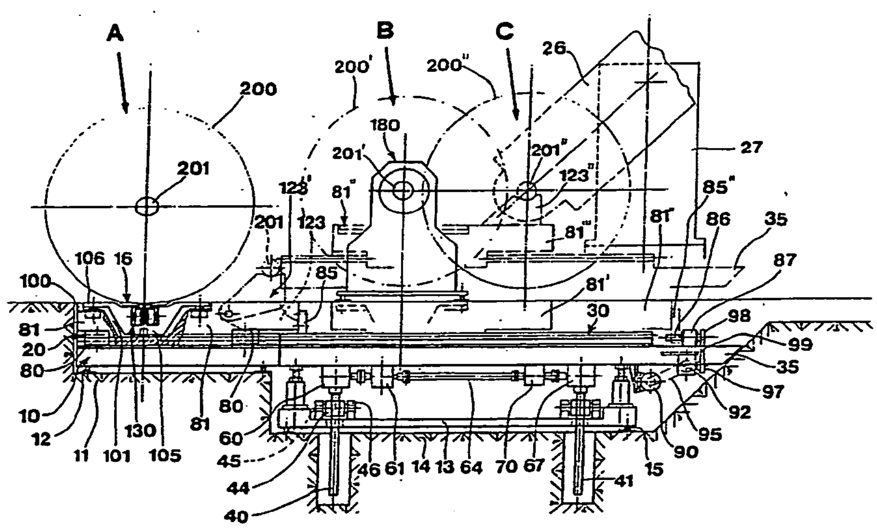

(57) Abstract

Loading apparatus for rolls wound with a strip of paper or other material for rotary printers, and for other kinds of machinery using rolls, comprising a station (A) where the roll (200) is taken on, a positioning station (B) at which the roll (200) is given its correct spatial position in relation to the mandrels of the roll-using machine (27) and a loading station (C) for mounting the roll (200) into said machine, said stations being connected by a translating means (81), a hoisting means (35) and a roll-bearing carriage (16), the correct spatial position of the roll (200) being given by controls from an electronic control panel to said parts (16), (35), (81) that transport said roll, and to a table (105) carrying the carriage (16), said table having devices for longitudinal and angular movement of the carriage (16) executed following signals received from the sensors mounted on detection devices (180) controlling the longitudinal, levelling and angular positioning of the roll (200) said devices being placed in the positioning station (B).

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AUTOMATIC LOADING APPARATUS FOR ROLLS OF PAPER AND OTHER MATERIAL

Many machines, such as rotary printers, impregnating systems for plastic laminates, packing machines and others still, require to be supplied with rolls of paper or of other material.

Considering the speed at which these machines work, the frequent replacement of empty rolls becomes a decisive factor in production especially in view of the weight and size of such rolls which often create problems of transport between point of supply and the machine, and in particular the problem of getting them properly mounted in position.

The new roll must in fact be:

- centered longitudinally in relation to the conical projections of the roll-carrying mandrels,
- given the correct angular position so that the two ends of the core, around which the roll of material is wound, can fit onto the above conical projections.

All this requires personnel, as well as down time and considerable waste for the machine. Since, further, such machinery is very costly and depreciation rates are high, periodical replacement of rolls is an expensive item of running costs.

The above invention eliminates these drawbacks at the same time offering important advantages as will be explained below.

Subject of the invention is an automatic loading means for rolls of paper or of other material for rotary printing machines, impregnating systems for plastic laminates, packing machinery and other kinds that use such rolls.

The loading apparatus comprises:

- a station where the roll is brought to the loading means;

- a positioning station for bringing the roll into the right position in relation to the roll-supporting mandrels;
- a loading station for loading the roll onto the machine.

Transfer from one station to another and other related operations are carried out by the following equipment:

- a roll-carrying carriage sliding along rails on the floor, supporting the roll parallel to said carriage's sliding axis;
- a table to support the carriage moving along rails;
- a translating means supporting the table, for transferring the carriage from the roll-arrival station to the positioning and loading stations, horizontally translatable on floor guides at right angles to the rails;
- a hoisting means with guides,for sliding the translating means, aligned with those on the floor;
- a detector system for ascertaining roll position;
- an electronic control panel for programming and controlling the movements of the various parts of the apparatus and for carrying through the automatic cycle.

As soon as the carriage has reached an approximately central position on the table, the two motor-driven devices determine hoisting movement and action by two levers one of which locks and the other presses the transversal sides of the carriage, one on each side, locking it in its position of arrival on the table.

At the positioning station the forward movement of one lever and simultaneous backward movement of the other lever ensure that the roll is longitudinally centered on the carriage in relation to the roll-supporting mandrels referred to above. The table can rotate fanwise, in relation to the translating means, around a vertical pin placed close to one of said

table's transversal sides, rotated by a motor-driven device which locks said table on the longitudinal axis of symmetry aligning its rails with those of the translating means.

Said device orientates the axis of the roll placed on the carriage in line with the common geometrical axis of the roll-supporting mandrels on the roll-utilizing machine.

The hoisting means translates vertically by devices mounted one close to one side and one close to the other, respectively facing one mandrel and the other referred to above. The devices respectively close to one or other of the above sides can synchronise their action for uniform translation of the hoisting means, or else can operate separately to obtain a position for the hoisting means such that the levels of the geometrical axis of the roll, on each side of said roll, respectively correspond to the levels of each of the mandrels referred to above.

The detector system comprises two detector devices, substantially the same, mounted as a pair in the positioning station, one on one side of the hoisting means and the other on the other side.

Each device comprises a slide equipped with a sensor for determining the longitudinal position of the roll, said sensor automatically regulating movement of said slide until it reaches the previously fixed position in relation to said roll.

Said sensors also control automatic action of the locking and pressing levers placed, on the table transporting the carriage, one against each side of said carriage, until the sensors signal that the roll has been longitudinally centered in relation to the position of said detector devices and therefore in relation to the above mandrels.

The detector devices comprise height sensors, one borne by one of the slides of said devices practically at the height of one of the above mandrels and consisting of a radiation emitter, the other sensor being borne by the other slide practically at the height of the other mandrel and consisting of a photoelectric cell or other type of receiving sensor.

A stop order is automatically given to the hoisting means when the radiations passing through the tubular core of the roll reach the photoelectric cell confirming that the geometrical axis of the roll is almost at the level of the above mandrels.

On each slide of the above devices a head is mounted, said head moving longitudinally and horizontally and supporting a cone-shaped projection by means of a ball joint.

Radial elastic means keep the geometrical axes of said cone-shaped projections reciprocally aligned with the geometrical axis between the mandrels of the roll-utilizing machine, the position of said projections being controlled by a group of radial sensors.

Advancement of the slides having brought the cone-shaped projections into contact with the roll core, said projections assume a more or less angular position according to the position of the roll in relation to the axis of alignment of said projections.

On receiving the signals issued by the radial sensors, the electronic control panel controls backward or forward movement of the translating means, rotation of the table supporting the carriage around its fulcrum on the translating means and vertical movement of one or other side of the hoisting means until the position sensors signal that the

geometrical axes of both cone-shaped projections coincide with the axis of the roll.

The translating means further comprises a device for discharging the roll core remaining on the mandrels when the whole roll has been consumed. Said discharging device consists of a projecting body rotating around a horizontal motor-driven shaft and having an oblong seat parallel to said shaft.

When rotating, said body can take up two positions: a discharging position with the seat for the roll core substantially horizontal and the other discharging position with the seat of said core substantially vertical.

Once the roll is exhausted the loading position of the discharger, translation of the translating means and raising of the hoisting means are operated automatically and progressively until the seat for the roll core is brought immediately below said core,held in position by the mandrels of the roll-utilizing machine, after which the mandrels are made to withdraw allowing the core to fall onto said seat and the discharger moves to the discharging area where it assumes a discharging position causing the core to fall in that area.

By means of the apparatus described, the following automatic cycle of operations is carried through.

The roll having been placed on the carriage, standing at some point accessible to the loading means, said carriage is brought to the first loading station passing along the floor rails, along the translator rails and along those for the table as far as the central point of said table.

The two levers on the table for locking and pressing rise up and lock the carriage in position.

The translating means moves towards the hoisting means, passing from the floor guides onto those of the hoisting means, carrying the roll to the positioning station.

The hoisting means rises until stopped by the sensors for indicating level.

The positioning sensors determine the correct position of the slides on the detector devices and the roll is then centered longitudinally in relation to the cone-shaped projections and therefore in relation to the mandrels mounted on the roll-utilizing machine.

The cone-shaped projections advance until aligned with roll orientation; the sensors on said projections adjust the geometrical axis of the roll to correspond with that of the mandrels and bring the roll into the correct position. The carriage then moves to the loading station and the roll is placed in line with the above mandrels.

The mandrels approach the roll and take it up.

The hoisting means descends and the translating means returns to the first loading station.

As soon as the roll is exhausted the sequence of core unloading movements commences at the conclusion of which the system is ready to start a fresh cycle.

Characteristics and purposes of the invention will be seen still more clearly by the following example of its execution illustrated by diagrammatic drawings.

Fig.1. The loading means seen from above.

Fig.2. A longitudinal section view of the loading means.

Fig.3. Partial front view of the loading means.

Fig.4. Detail of the translating means seen from above.

Fig.5. Detail of the translating means,longitudinal section.

Fig.6. Detail of the translating means, transversal section.

Fig.7. Detail of one of the devices, mounted in a pair,for detecting the longitudinal position of the roll, longitudinal section.

Fig.8. Detail of the sensor for longitudinal positioning of the roll, transversal section.

Fig.9. Detail of the set of radial sensors ascertaining the angular position of the roll, transversal section.

Fog.10.Detail of one of the devices, mounted in a pair, for ascertaining the position of the roll, transversal section.

The apparatus comprises a front base (10), corresponding to supply station (A) (Fig.2), said base being secured to the floor (11), adjustable in height by means of feet (12),and a central base (13) (Fig.2) secured to the floor (14) and adjustable in height by its feet (15).

The guides (20) are mounted on the front base (10) and consist of a pair of cylindrical tubes (22), (23) fixed to the longitudinal support (24) (Fig.3) secured by bolts.

Said guides are aligned with others (30) (Fig.4) of similar composition mounted on the hoisting means (35) and comprising the pairs of cylindrical tubes (32), (33) fixed to the longitudinal support (34).

The hoisting means (35) is supported by the vertical threaded rods (40,41,42,43) inserted in threaded ring nuts (44) secured inside the pins (45) housed in the supports (46) of the central base (13).

Said threaded rods are rotatable by means of electric motor (60) (Fig.1) through a kinematic transmission comprising the connector block (62) for connection to shaft (63), connector blocks (61) for connection to shafts (64), (65) and connector blocks (66, 67, 68, 69).

The connector block (70), for connection to electric motor (71) is mounted between shaft (64) and connector block (67). Connector block (72), for connection to electric motor (73), is mounted between shaft (65) and connector block (69). Coupling (74) is mounted between connector block (62) and electric motor (60).

Coupling (75) is mounted between shaft (63) and connector block (61).

By means of these couplings motor (71) rotates threaded rods (40, 41) placed at one side of the hoisting means (35), while motor (73) rotates threaded rods (42), (43) placed at the other side of said hoisting means.

Simultaneous rotation of threaded rods (40-43) raises or lowers hoisting means (35) while rotation of the pair of threaded rods (40,41) or of the pair (42, 43) makes possible adjustment of hoister means height on one side and on the other.

Guides (20) and (30) on the base (10) and on the hoisting means (35) respectively, support the translating means (81) by means of the bushings (80).

Threaded ring nuts (85) (Figs. 1 and 2) are mounted on the inner side of said translating means and, within said nuts, pass threaded rods (86) mounted longitudinally and parallel on the hoisting means (35) with supports (87) allowing said rods to rotate freely.

An electric motor (90) is installed on the hoisting means (35), said motor rotating threaded rods (40), (43) assisted by a kinematic transmission comprising wheels (91), (92) connected by chain (93), shafts (94) and (95), connection block (96), cog wheels (97), (98) connected by chains (99). By putting motor (90) in rotation, according to its direction,

translating means (81) passes from base (10) (Fig.2) to the hoisting means (35) along guides (30).

The translating means (81) has an oblong longitudinal cavity (100) in which, along its axis (Figs. 2,5, 6) there is a recess (101 of trapezoidal cross section; on the edges of said cavity, at each of the four corners is mounted a ball bearing (102) on which rests the table (105) of a trapezoidal cross section with horizontal extensions (106), (107). By means of bushing (110) (Figs. 3, 5) said table (105) can swing around the vertical pin (111) fixed to the translating means (81) and placed at one end of said table's longitudinal axis.

Close to the other end there is a pin (112) on table (105) which pin penetrates into the hole (113) of a tie rod (114) fixed to the sliding means (115). Said sliding means is threaded and in this threading the small threaded shaft(116) is caused to rotate by the kinematic group (117) driven by the motor (118) (Fig. 4).

Therefore, according to motor rotation, the angle of table (105) can be varied horizontally in relation to the longitudinal axis along which the rail (130) is placed consisting of two iron channels, one opposite the other, made to take the wheels (132), (133) mounted as a pair on either side of the vertical central support (134) under a flat carriage (16). This carriage (16) (Fig.3) is so shaped as to have a slight longitudinal depression (141) on which the roll (200) rests and by which it is guided.

The translating means (81) houses a device (145) composed of a shaft (146) to which, at one end, is fixed the lever (147) with adjustable head (148) and, at the other end, an arm (149) connected to an electric motor (154) by a threaded

ring nut (150), revolving on the end of said arm and in which a threaded shaft (151) rotates, said shaft being in turn connected to the shaft of said motor by a rotating joint (152). A second device (159), substantially the same as the first device (145), comprises a shaft (160), electric motor (161) and lever (162) with a head (163).

When not in use the two levers (147) and (162) remain below the carriage (16) allowing it to slide freely along the guide (130).

When the carriage is moved by hand to a practically central position on the translating means (81), the two levers (147) and (162) rise up and their respective heads (148) and (163) move against the one side (17) and the other side (18)of said carriage locking it in a position from where it is easily ad- adjustable by means of the two motors (154) and (161).

The rails (170) and (171) of the translating means (81) are substantially the same as rail (130) to which they are aligned one on each side of the table (105).

On the floor (11),at either side of the translating means(81), are rauks (173) and (174) substantially alike those already described (130), (170) and (171).

At a central point on its transversal axis, the translating means (81) supports a device (123) (Figs. 4, 6) for discharging the core (201) of the roll (200) when said roll is exhausted.

Said discharging device consists of a body fixed to, and projecting out, from a shaft (125) revolving on the sides (122) of the translating means (81). At the summit of said body there is a channel (124) made for housing the cores (201) of the rolls.

A toothed arch (126) is splined onto one end of the shaft(125), said arch meshing with pinion (127) which the electric motor

(129) rotates through the ratiomotor (128).
Shaft (125) and channel (124) are parallel one to another and perpendicular to the direction of movement of the translating means (81). Therefore when said translating means takes up its position at the roll-bearing arms (26) of the machine (27), said channel (124) will lie parallel to the roll core (201) and beneath it.
Devices (180) (181), showing the position of the roll (200) (Figs. 2, 3, 7-10), are mounted at positioning station B on eigher side of the hoisting means (35).
Each of these detector devices comprises a base (182) on which guides (183 are mounted made from a cylindrical bar, over which move the bushings (185) fixed to the slide (184). Supports (186) for the threaded rod (187) are rotated by an electric motor (188) and are fixed to the above base. A threaded bushing, mounted on said threaded rod (187) is supported by a bracket (190) fixed to the slide (184).
Said slide comprises parallel horizontal guides (191) made from cylindrical bars, along which move the bushings (192) fixed to the head (193) of the detecting device concerned. Slide (184) supports, on a bracket (207), articulation (202) of fluidic cylinder (203) for movement of piston (204) secured to articulation (205) of bracket (206) fixed to the head (193) by bushing (192). By means of a vertical plate (210) and coupling (211), said head (193) supports the detecting cone (212) for roll (200) with its tubular core(201). Said cone is fixed to a rod (213) articulated, in relation to the coupling (211), by a ball joint (214).
An adjustable balancing weight (215) is mounted on the back end of said rod.
A spherical collar (216) is mounted between said weight and ball joint (214), said collar carrying radial pressure

devices (220) each comprising a compression spring (221) and a piston (222) supported by a sliding structure (223). A rolling means (224) articulated in the pin (225) is mounted at the end of said piston.

A spherical collar (230) is mounted between the ball joint (214) and the detecting cone (212), said collar supporting radial electronic sensors (231) and (232) (Figs. 7 and 8) sustained by the end of the coupling (211).

At the top of centering cone (212) an electronic sensor (233) is connected to the central control panel by an electric wire (234).

On a level lower than that of detecting cone (212), slide (184) has at its front end an electronic limit stop (240), said stop comprising the horizontal piston (241) with head (242) sliding within the cylinder 243 and subject to pressure by a compression spring (244).

At the back end of said piston (241) there is a cone-shaped projection (245) on whose trajectory lies sensor (246) supported by structure (247) fixed to the slide (184).

The detector device (181), substantially the same as device (180), includes the detecting cone (195), head (196) and electronic limit switch (197).

In Figure 2, at station C, there is a diagrammatic presentation of the position of roll-carrying arms 26, a part of the machine 27.

After placing the roll (200) on the carriage (16), stationed at a point accessible to loading means, the carriage is moved by hand to a practically central position on table (105) (Figs. 1 and 4) supported by translating means (81). Special sensors, not shown in the figures, emit luminous signals when the carriage has been centered, or if it is

still not centered on said table (105).

Once centering has been achieved, a switch is pressed to start the automatic cycle which takes place as follows.

Operated by their respective motors the two levers (147), (162) on devices (145), (159) each exert pressure on sides (17), (18) respectively of the carriage (16) thus locking it (see Figures 1,3, 4-6).

Motor (90) (Figs. 1, 2) starts up and moves, by means of the already described kinematic transmissions and of the horizontal threaded rods (86), the translating means (81) onto the hoisting means (35) as far as position (81') (Fig. 2) indicated by dotted lines, corresponding to the position of the carriage between the detector devices (180),(181).

Motor (60) (Fig.1) moves the vertical threaded rods(40-43) (Figs. 1 and 2) which raise the hoisting means (35) lifting the roll from (200) to (200') practically in alignment with detector cones (212) and (195).

When the photoelectric cell (233) (Fig.7),placed inside the cone-shaped projection (211) and connected by a wire (234) to the control panel operating the whole automatic cycle, receives rays from a source of light inside the detector cone (195), Figs. 1, 2, 3), said cell stops the lifting motion of the hoisting means (35).

The rays of light (198) (Fig.7) from inside said detector cone (195) reach the photoelectric cell (233) through the tubular core (201) of the roll (200).

After the signal to cease hoisting movement, a signal goes to motors (188) (Fig.3) which translate the slides (184) fitted with sensors (240) and (197).

As soon as said sensors meet said roll, they signal the slides to stop forward movement and if one is too far forward it is made to move back.

According to measurements made by the above sensors (240) and (252), if thereby it is found that the roll is not perfectly centered between them, signals to this effect received at the electronic control panel and then issued by it, actuate motors (154) and (161) (Fig.4) which, by means of arms (147) and (162), move the carriage (16) until it is correctly centered.

The fluidic cylinders (203) (Fig.7) then begin to function and move the cone-shaped projections (121) and (195) until they touch the core (201) of the roll (200').

As already described, the cone-shaped projections are subject to action by pressing means (220) (Figs. 7, 10); when said projections are not active, said pressing means keep them elastically in a central position and therefore reciprocally aligned on an axis practically parallel to the axis common to the roll-bearing mandrels of arms (26) of the roll-utilizing machine (27) (Fig.2).

The electronic sensors (231) and (232) (Figs. 7, 9) ascertain if the cones are at an angle in relation to the correct central position, any such angle being due to imperfect horizontal or vertical alignment of the roll's axis in relation to alignment between the cones (212) and (195).

To correct the position of the roll with that of cone (195) the electronic control panel actuates motor (90) (Fig.1) for moving the threaded rods (86) horizontally, and motor(71) that moves the threaded rods (40) and (41) vertically

To correct the position of the roll in relation to cone(212) motor (118), supported by translating means (81) moves the table (105) horizontally round the fulcrum point (11) (Figs. 1, 4, 5); motor (73) then moves threaded rods (42), (43) vertically.

To permit the threaded rods (40), (41), and therefore motor (71),to operate independently of threaded rods (42), (43) and therefore of motor (73), connection with motor (60) is cut off by detachment of joint (74) and connection between shafts (64) and 65) is cut off by detachment of joint (75) (Fig.1).

Position of the roll having been corrected until its axis is practically parallel with the axis common to both roll-bearing mandrels, by means of motors (188) Fig.3) in detector devices (180), (181) the cones withdraw to their resting position..

Adequate luminous signals, not illustrated in the figures, light up when the roll has reached its correct position.

Translating means (81) then moves in the direction of arms (26) on the main machine (27) (Figs. 1, 2) and into position (81") where the hoisting means (35) takes the roll (200) to position (200").

The control panel releases levers (147) and (162) locking the carriage (16) (Fig.4), and the mandrels move out from the roll-bearing arms and close into the core (201") of the roll.

Motor (60) (Fig.1) lowers the hoisting means (35), motor (90) starts up and returns the translating means (81) to its initial resting position shown in Fig.1.

When the roll is exhausted, switches on the control panel can be pressed to start the roll-changing sequence.

Motor (129) (Fig.4) raises the discharging means (123) to position (123') (Fig.2).

Motor (90) moves the translating means (81) back to arms (26) on the main machine (27) in position (81").

Motor (60) starts up for raising the hoisting means (35) and then the translating means (81) to position (81"')

and the discharging means (123) to position (123") (Fig.2) where it can take hold of core (201") of roll (200). The position of the hoisting means is indicated by (35') and that of the table by (105").

Having taken hold of the core as above, the mandrels on the main machine (27) return to their resting positions, the hoisting means (35) returns to its lower level and the translating means (81) returns to its starting position as illustrated in Figures 1 and 2.

This completes the cycle and a fresh one can be begun. As already explained the loading means carries out the following operations by almost entirely automatic movements:

- spatial positioning of the roll so that it is centered, in relation to the position of the mandrels on the roll-utilizing machine, in such a way that said roll's axis is practically parallel to the axis common to said mandrels and lies on the same horizontal plane;
- mounting of said roll between said mandrels by a simple translation movement of the translating means and therefore of the roll;
- discharge of the core when said roll is exhausted.

The above process eliminates almost entirely the need for personnel to change rolls, drastically reduces down time and waste, improves efficiency, reduces costs and increases output.

Claims

1. Loading apparatus for rolls of paper or of other material for rotary printers, impregnating systems for plastic laminates, packing machines and other kinds of roll-using machines, characterized in that said apparatus comprises a station (A) for picking up the roll (200), a positioning station (B) where the roll (200) is given the correct position in space in relation to the mandrels of the main utilizing machine (27), and a loading station (C) at which the roll (200) is loaded into said main machine (27).

2. Loading apparatus for rolls of paper or of other material for rotary printers, impregnating systems for plastic laminates, packing machines and other kinds of roll-using machines as in claim 1, characterized in that it comprises a roll-holding carriage (16) sliding along rails (173), (174) fixed to the floor, said carriage supporting the roll (200) parallel to its sliding axis, a table (105) supporting the carriage (16) on rails (130) on which it slides, a translating means (81) supporting the table (105) and transferring the carriage (16) from the picking up station (A) to the positioning stating (B) and loading station (C), said translating means moving horizontally on floor guides (20) perpendicular to the rails (173), (174), a hoisting means (35) with sliding guides (30) for the translating means(81) aligned with the floor guides (20), a system for detecting the spatial position of the roll and an electronic control panel for programming and operating the movements of the various component parts and for carrying through an automatic cycle.

3. Loading apparatus for rolls of paper or of other material for rotary printers, impregnating systems for plastic laminates, packing machines and other kinds of roll-using

machines as in claim 2, characterized in that, after the carriage (16) has reached a practically central position on the table (105), two motor-driven devices (145), (159) placed on said table (105) raise and actuate a locking and pressing lever (147), (162) respectivaly against the transversal sides (17), (18) of the carriage (16) locking it in its position of arrival on the table (105) or in one of the positions obtainable by moving forward one of the levers (147), (162) and simultaneously moving backward the other lever (147) or (162) for longitudinally centering the roll (200) placed on the carriage above mentioned in relation to the mandrels of the main roll-using machine (27).

4. Loading apparatus for rolls of paper or of other material for rotary printers, impregnating systems for plastic laminates, packing machines and other kinds of roll-using machines as in claim 2, characterized in that the table(105) can rotate fanwise in relation to the translating means(81) around a vertical pin (111) placed close to one of said table's vertical sides moved by a motor-driven device (112-118) locking it on the axis of longitudinal symmetry aligning said table's rails (130) with those (170),(171) of the translating means, or locking it in one of the possible positions on one or other side of said axis of symmetry so that the axis of the roll (200) placed on the carriage (16) shall be oriented with the common geometrical axis of the mandrels forming part of the main roll-using machine (27).

5. Loading apparatus for rolls of paper or of other material for rotary printers, impregnating systems for plastic laminates, packing machines and other kinds of roll-using machines as in claim 2, characterized in that the hoisting means (35) can translate vertically by means of devices

(40-41, 42-43) placed close to one side and the other side respectively of one and the other mandrel of the roll-using machine, it being possible to actuate the devices (40-41, 42-43) close to one or the other side in a synchronised manner for uniform translation of the hoisting means (35) or else to actuate devices (40-41) close to one side independently of those (42-43) placed on the other side to permit spatial position of the hoisting means (35) so as to make the levels of the geometrical axis of the roll (200) on one side of it and on the other correspond respectively with those of one mandrel and the other mandrel or the roll-using machine (27).

6. Loading apparatus for rolls of paper or of other material for rotary printers, impregnating systems for plastic laminates, packing machines and other kinds of roll-using machines as in claim 2, characterized in that the system of detection comprises two detecting devices (180), (181) substantially the same, placed as a pair in positioning station (B) one on one side and one on the other side of the hoisting means (35), each comprising a slide (184) equipped with a sensor (240) for the longitudinal position of the roll (200), said sensor automatically adjusting the movement of said slide (184) until a previously fixed position in relation to the roll (200) is reached, said sensors (240) automatically operating the locking and pressing levers (147), (162),placed on the table (105),against the sides (17), (18) of the carriage (16) until said sensors (240) signal that the roll (200) has been centered in relation to the position of said detection devices(180), (181) and therefore in relation to the mandrels of the machine (27).

7. Loading apparatus for rolls of paper or of other material for rotary printers, impregnating systems for plastic laminates, packing machines and other kinds of roll-using machines, as in claim 6, characterized in that the detection devices (180), (181) comprise sensors for levelling, one placed on one of the slides(184)practically on the same level as one of the mandrels of the machine (27) and consisting of a means for emission of radiations, the other sensor being placed on the other slide (184) practically on the same level as the second mandrel and consisting of a photoelectric cell (233) or other type of receiving sensor, an order to stop hoisting being automatically conveyed to the hoisting means (35) when, on passing through the tubular core (201) of the roll (200), the radiations strike the photoelectric cell (233) confirming that the geometrical axis of the roll (200) has practically reached the level of the mandrels referred to above.

8. Loading apparatus for rolls of paper or of other meterial for rotary printers, impregnating systems for plastic laminates, packing machines and other kinds of roll-using machinery as in claim 6, characterized in that on each slide (184) there is a head (193) moving longitudinally and horizontally, said head supporting, by means of a ball joint (214), a conical projection (212), (195),the geometrical axes of said conical projections (212), (195) being maintained, by radial elastic means (221), in a position coinciding with the axis of reciprocal alignment, corresponding to orientation of the geometrical axis between the mandrels of the machine (27), the position of said conical projections (212), (195) being controlled by a set of radial sensors (231), (232) for angular positioning, contact between

said cone-shaped projections (212), (195) and the core(201) of the roll (200) taking place with consequent adaption of said projections to a more or less angular position according to the position of the roll (200) in relation to their axis of alignment, there then being automatic translation either forward or backward of the translating means (81), rotation of the table (105) supporting the carriage (16) round its fulcrum (111) on the translating means (81) and vertical translation of one or other side of the hoisting means (35) until the sensors (231), (232) signal that the right angular position has been reached coinciding the axis of roll (200) with the geometrical axes of both conical projections (212), (195).

9. Loading apparatus for rolls of paper or of other material for rotary printers, impregnating systems for plastic laminates, packing machines and other kinds of roll-using machines as in claim 2, characterized in that the translating means (81) comprises a device (123) for discharging the core (201) of the roll (200), said core remaining on the mandrels when the whole roll is exhausted, said device consisting of a projecting body revolving round a horizontal motor-driven shaft (125) and having an oblong seat(124) parallel to said shaft whose above body, when rotating,can take up two positions, a loading position with the seat(124) for the core (201) of the roll (200) substantially horizontal, and a discharging position with the seat (124) for the core (201) substantially vertical, so that on exhaustion of the roll the following movements are made in automatic progression, namely, the loading position for the discharging device (123), translation of the translating means (81) and raising of the hoisting means (35) to bring the seat(124) for the core (201) of the roll (200) immediately below said

core (201) still held by the mandrels of the roll-using machine (27), withdrawal of both mandrels allowing the core (201) to fall into said seat (124), transfer of the hoisting means (81) and then of the discharging device (123) to the discharging area where said device assumes its discharging position allowing the core (201) to drop into the discharging area.

10. Loading apparatus for rolls of paper or of other material for rotary printers, impregnating systems for plastic laminates, packing machines and other kinds of roll-using machinery as in claims 1 to 9, characterized by the following automatic sequence of operations.
The roll (200) having been placed on the carriage (16), stationed at a point accessible to loading means, said carriage (16) moves to station (A) passing along the floor rails (173), (174), along the rails (170), (177) of the translating means and along the rails (130) of the table (105) until it arrives at a central point on said table.
The locking and pressing levers (148), (162) of the table (105) rise and lock the carriage (16) in position.
The translating means (81) advances on the hoisting means (35) passing from the floor guides (20) to those (30) of the hoisting means (35) carrying the roll (200) to the positioning station (B).
The hoisting means (35) rises until stopped by the levelling sensors (233).
The positioning sensors (240), (197) then determine the correct position of the slides (184) of the positioning devices (180), (181), then cause the roll (200) to be longitudinally centered in relation to the conical projections (212), (195) and therefore in relation to the mandrels of of the roll-using machine (27).

The conical projections (212), (195) move forward taking up a position corresponding to orientation of the roll(200) after which the angular positioning sensors (231), (232) adjusting the said conical projections (212), (195), cause the geometrical axis of the roll (200) to come in line with that of the mandrels.

The carriage (16) is then transferred to loading station (C) and the roll (200) is placed in line with the mandrels of the roll-using machine (27).

The mandrels approach the roll (200) and pick it up.

The hoisting means (35) is lowered and the translating means (81) returns to station (A).

As soon as the roll (200) is exhausted, movements for unloading the core (201) of the exhausted roll (200) take their due course after which the apparatus and all its parts are in the correct positions for starting a fresh cycle.

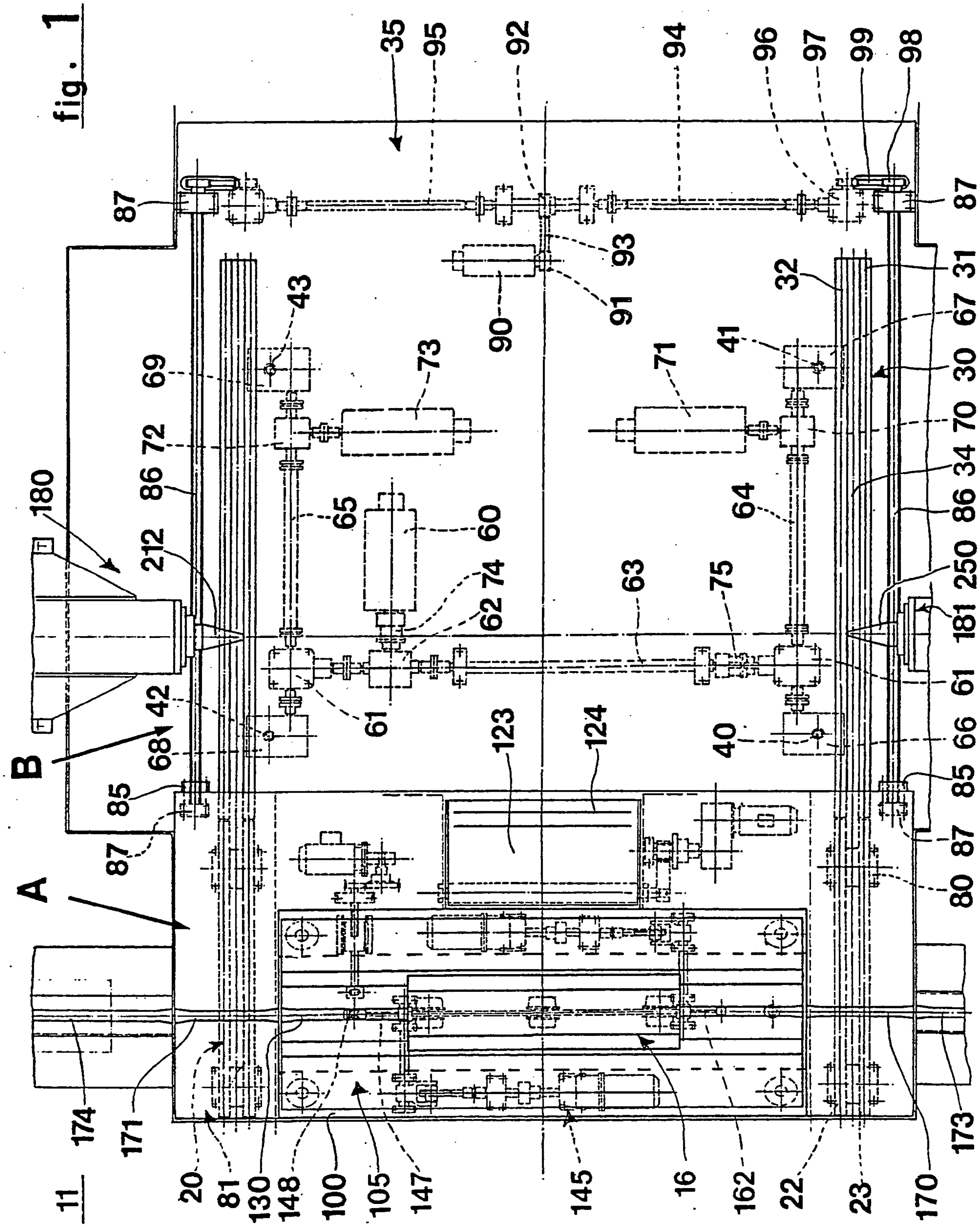
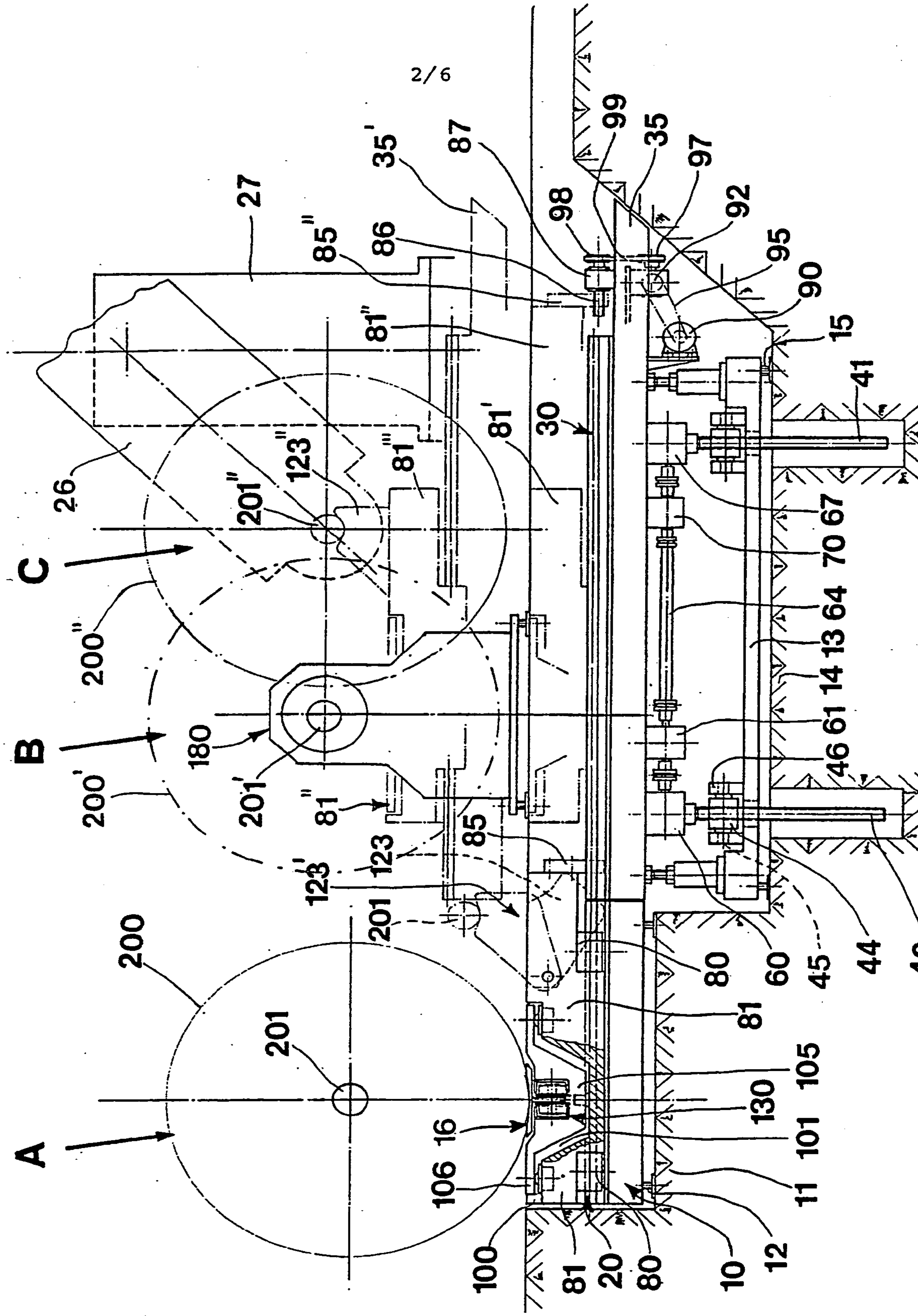


fig. 1


A
B
C
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27
35
35'
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106
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200'
201'
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fig. 2

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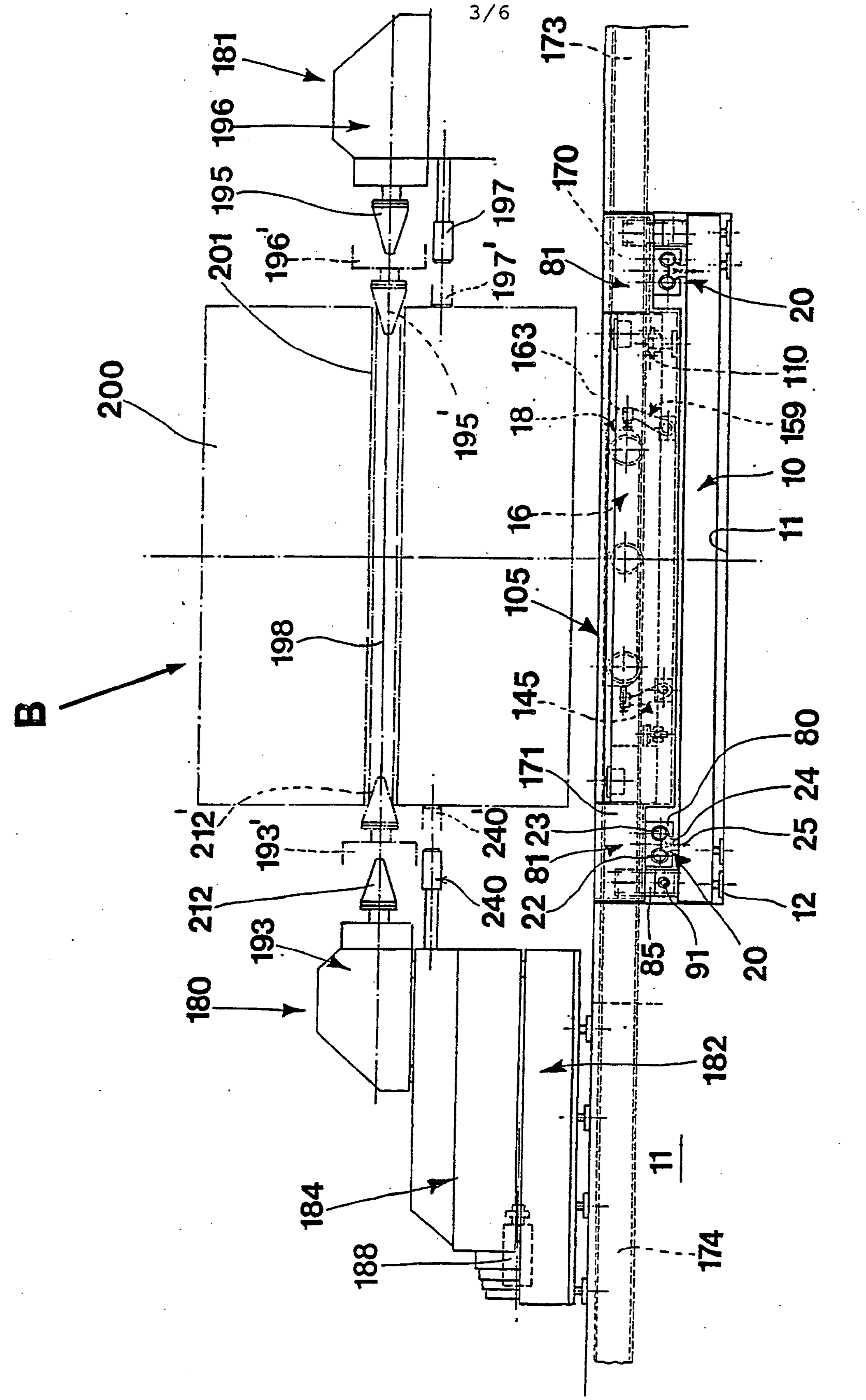
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171
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23
25
212'
193'
240'
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174

fig.3

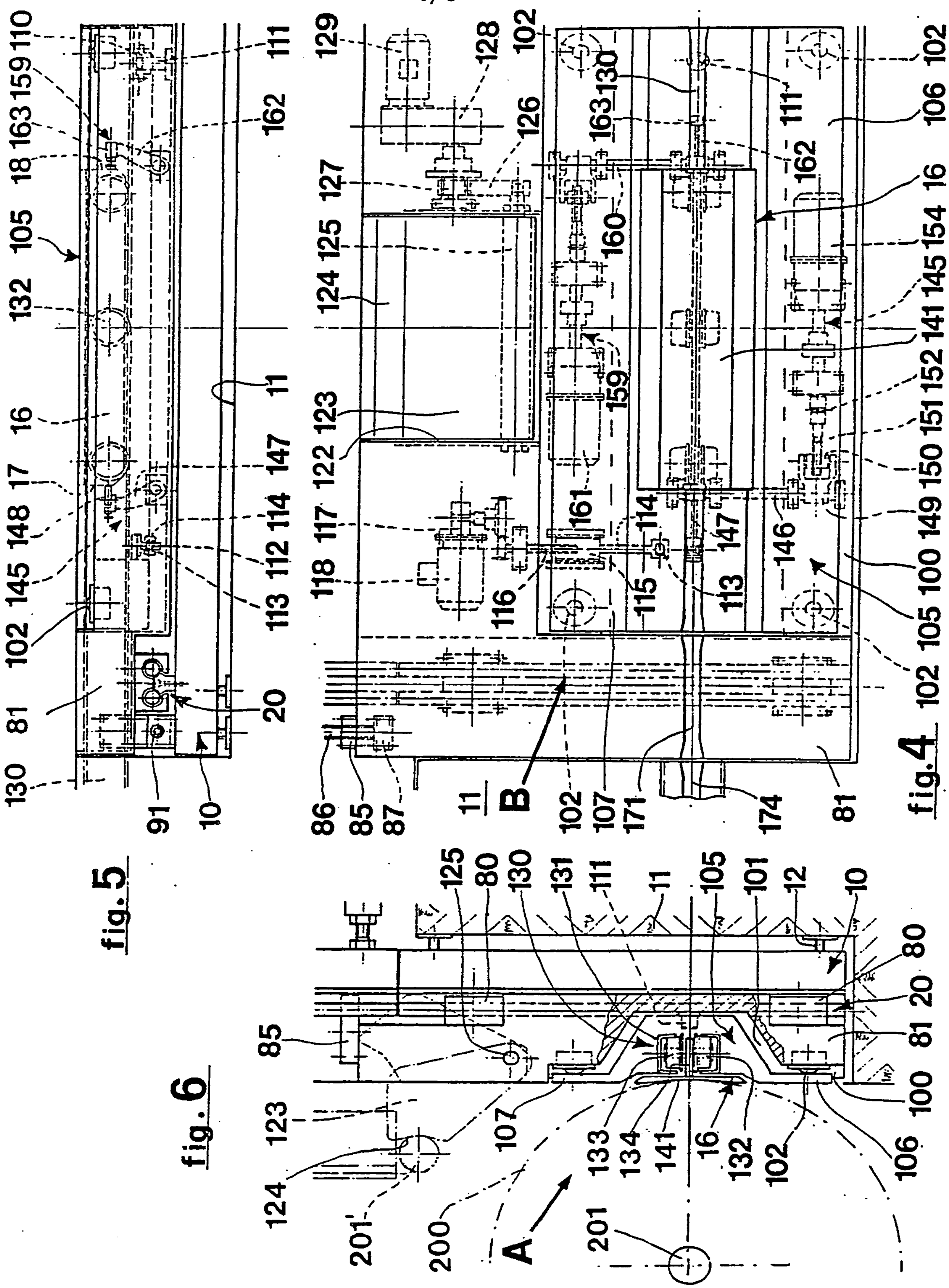

fig.4

fig.5

fig.6

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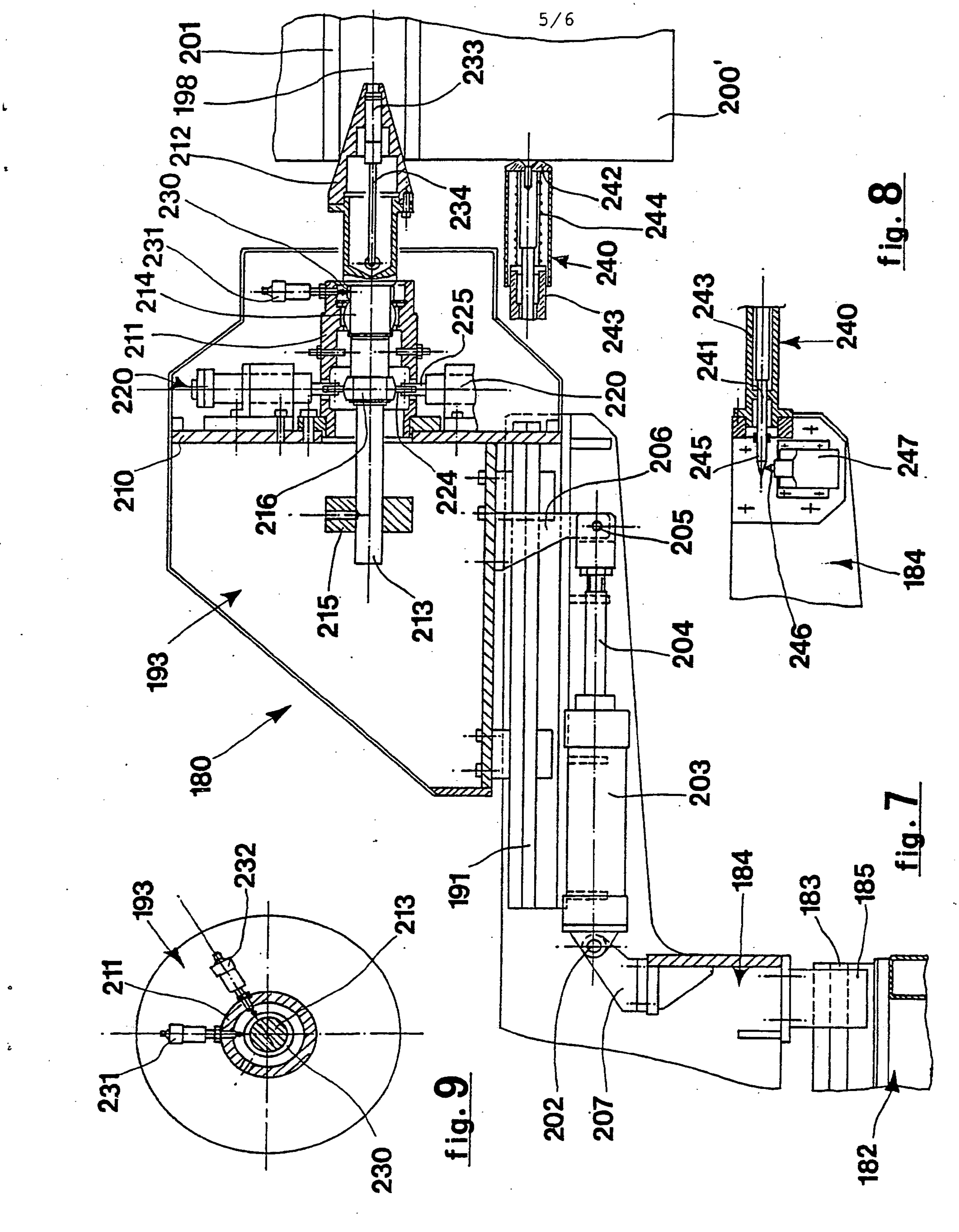

fig. 7

fig. 8

fig. 9

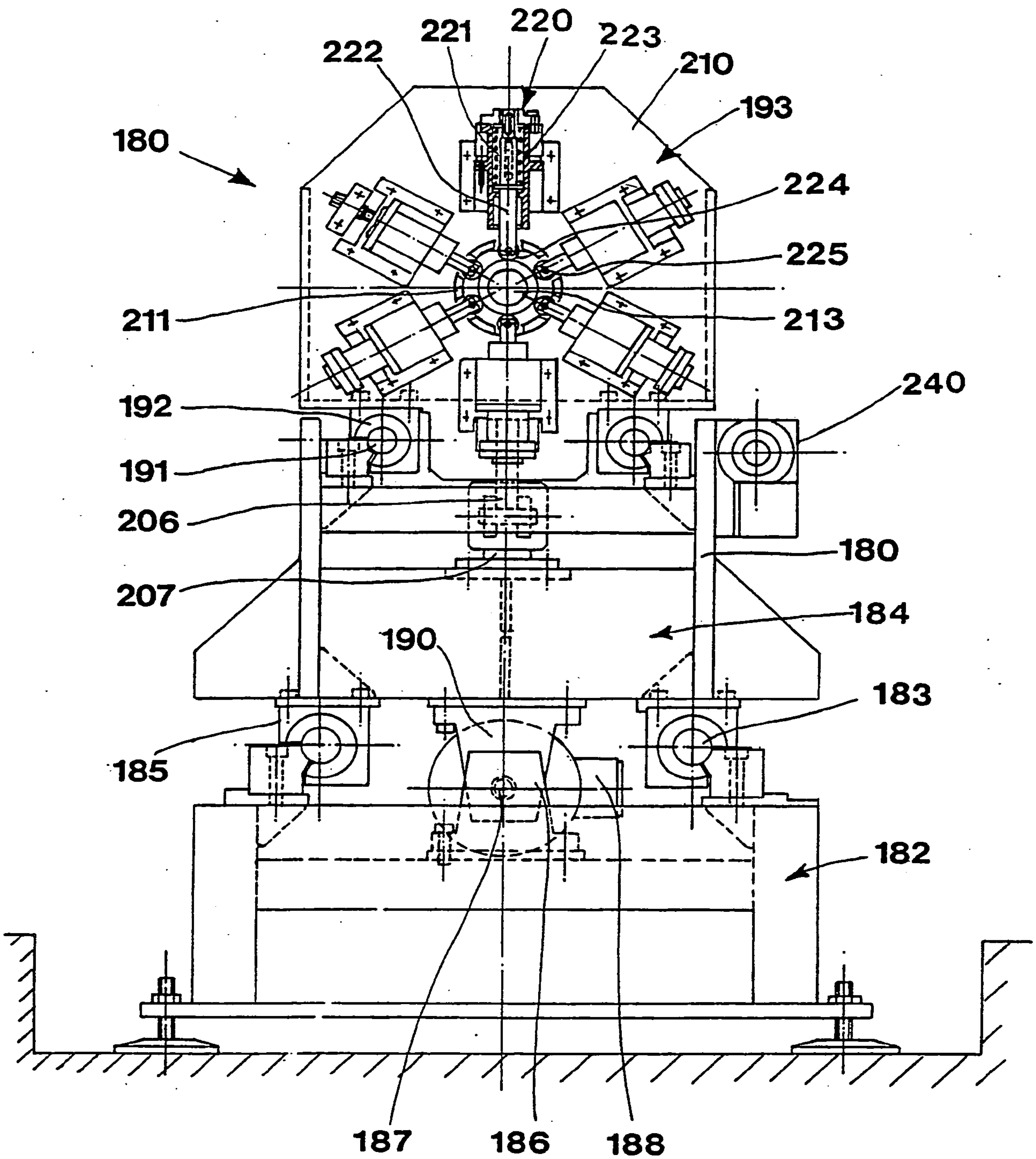
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fig.10

INTERNATIONAL SEARCH REPORT

International Application No PCT/IT 88/00028

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC^4: B 65 H 19/12

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC^4	B 65 H

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	US, A, 4131206 (TOMOSHI KAWADA) 26 December 1978, see abstract; claims 1-3,5-12; figures 1-9,11-13B; column 1, line 60 - page 2, line 30	1
Y		2,4,5
A		3,6-10
	--	
X	GB, A, 2106875 (RENGO CO. LTD) 20 April 1983, see abstract; claims 1,2; figures 1,2,4, 5,7,8; page 1, lines 5-31	1
A		2-10
	--	
X	EP, A, 0227887 (ARNOLDO MONDADORI EDITORE SpA OFFICINE GRAFICHE) 8 July 1987, see column 6, line 24 - page 7, line 23; claims 1-4,8-12; figures 2-4	1
A		2-10
	--	

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"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
10th November 1988	- 8 DEC 1988
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	P.C.G. VAN DER PUTTEN

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
Y	DE, A, 3402582 (MAN ROLAND DRUCKMASCHINEN AG) 8 August 1985, see page 7, line 21 - page 8, line 16; claims 1,5-8; figures 1-4,9,10; page 11, line 27 - page 12, line 4; page 18, line 25 - page 20, line 11	2,5
A		3,4,6-10
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Y	DE, A, 2631355 (FALKENSTEIN, HERMANN JOSEF) 19 January 1978, see page 2, line 1 - page 3, line 20; claims 1,4; figures 1-4	4

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. IT 8800028
SA 22070

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on 24/11/88
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4131206	26-12-78	JP-A- 53115308	07-10-78
GB-A- 2106875	20-04-83	FR-A,B 2514100	08-04-83
		AU-A- 8898382	14-04-83
		JP-A- 58078941	12-05-83
		NL-A- 8203851	02-05-83
		DE-A- 3236873	28-04-83
		CH-B- 649516	31-05-85
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		US-A- 4682743	28-07-87
		JP-A- 58078940	12-05-83
EP-A- 0227887	08-07-87	None	
DE-A- 3402582	08-08-85	None	
DE-A- 2631355	19-01-78	None	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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